Vehicle Technology and Trends 2013

Module 2

I-CAR®

Class 0:49

A-1

MODULE 2–NORTH AMERICAN VEHICLE MAKERS

Topic A. Chrysler LLC

Learning Objectives

The learning objectives for this module include describing features on new vehicles and technology from:

- **Chrysler LLC.**
- **Ford Motor Company.**
- **General Motors.**

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- Chrysler LLC.
- Ford Motor Company.
- General Motors.

Notes

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Topic A. Chrysler LLC (cont'd)

A-2v

Video: Tech/Trends Trivia

Notes

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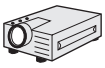
Topic A. Chrysler LLC (cont'd)



A-3

2013 SRT Viper

The Dodge Viper has been redesigned for 2013, and it no longer carries the "Dodge" brand, but "SRT," which stands for "Street and Racing Technology." Highlights of the body include:

- a steel space frame structure.
- a carbon fiber hood, roof, and deck lid.
- aluminum doors, both the frame and skin, as well as aluminum rocker panels, front bumper reinforcement, and front and rear suspension. An aluminum cross brace over the engine compartment can be seen when opening the hood.
- a cast magnesium cowl panel. Chrysler claims this is the largest cast application of magnesium for any vehicle.

Notes

Objectives Worksheet

The Dodge Viper has been redesigned for 2013, and it no longer carries the "Dodge" brand, but "SRT," which stands for "Street and Racing Technology." Highlights of the body include a:

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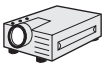
Topic A. Chrysler LLC (cont'd)



A-4v

Video: 2013 Dodge Dart

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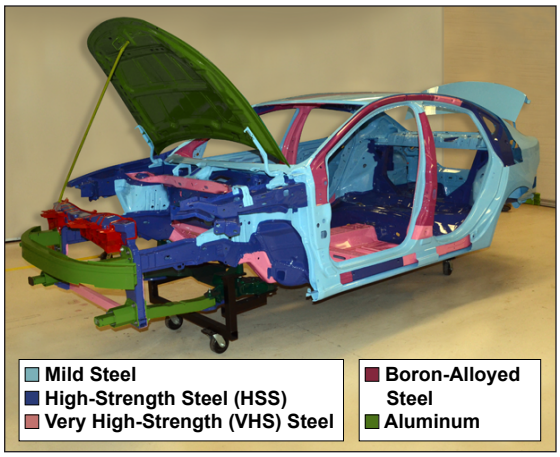
Topic A. Chrysler LLC (cont'd)

A-5

Dodge Dart Construction Features



The first Dodge Dart was released in 1960. The 2013 Dodge Dart is based on the European-only Alfa Romeo Giulietta (joo-lee-ET-ah).

Some construction features on the Dart include:

- very high strength (VHS) steel, or UHSS front floor pan and crossmembers. This means no pulling out the sides to straighten a damaged floor pan. Damage to the floor pan requires replacing the floor pan.
- boron-alloyed steel for the A-pillar, roof rail, and B-pillar reinforcements.
- inner B-pillars just as strong as the floor pan.

Aluminum is used for the hood, bumper reinforcement, and front lower rail crushboxes.

When the vehicle was launched in the spring of 2012, the front lower control arms were steel. In November of 2012, the lower control arms were changed to aluminum. Some steel replacement lower control arms are available, allowing only the damaged steel control arm to be replaced.

Notes

Objectives Worksheet

Some construction features on the 2013 Dodge Dart include very high strength (VHS) steel, or UHSS front floor pan and crossmembers. This means no pulling out the sides to straighten a damaged floor pan. Damage to the floor pan requires replacing the floor pan.

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Topic A. Chrysler LLC (cont'd)

Eventually, however, all the replacement parts will be aluminum. If replacing a damaged steel front lower control arm, and the replacement is only available as an aluminum part, the control arms must be replaced as a pair so that both control arms are made from the same type of metal. Do not use a steel and aluminum control arm on the same vehicle.

Notes

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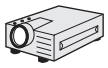
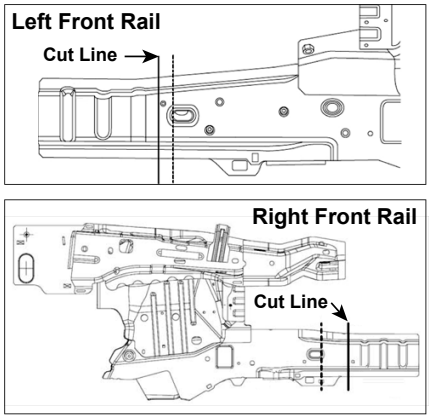
Topic A. Chrysler LLC (cont'd)



A-6

Sectioning Dodge Dart Front Lower Rails



Courtesy of Chrysler LLC

Repair procedures on the front lower rails of the Dodge Dart include:

- sectioning procedures behind the convoluted areas. Exact locations are in the body repair manual on the Chrysler website.
- different cut line locations on the left lower rail vs. the right lower rail.
- butt joints with a 13 mm (½") backing.

Notes

Objectives Worksheet

Sectioning procedures on the front of the Dodge Dart include:

- front lower rail sectioning procedures behind the convolutions.
- different cut line locations on the left lower rail vs. the right lower rail.
- butt joints with a 13 mm (½") backing.

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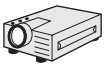
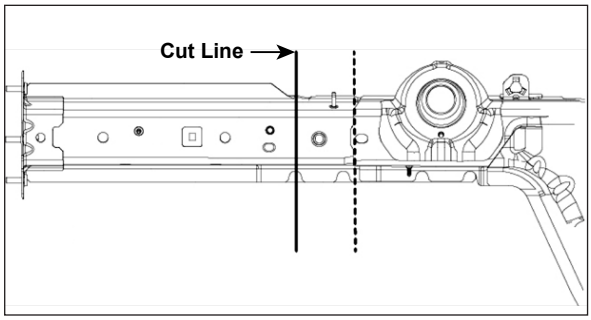
Topic A. Chrysler LLC (cont'd)



A-7

Dodge Dart Rear Rails



Courtesy of Chrysler LLC

Repair procedures on the rear rails of the Dodge Dart include:

- a sectioning procedure that requires cutting through the outer rail only. There is an inner reinforcement directly beneath. The cut line is in the same location on the right and left side. The exact cutting location is listed in the body repair manual on the Chrysler website.
- a butt joint with backing weld.
- using the reinforcement as a backing for the butt joint.

Notes

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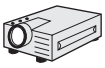
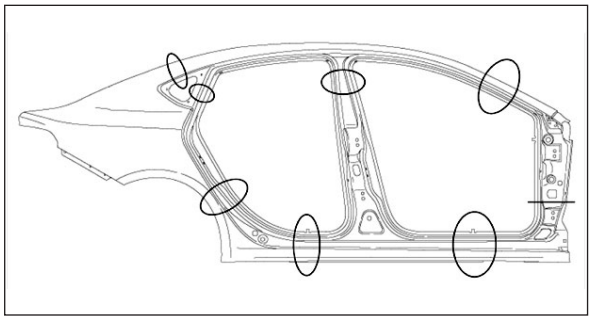
Topic A. Chrysler LLC (cont'd)



A-8

Dodge Dart Side Aperture Repairs



Courtesy of Chrysler LLC

There are sectioning procedures on several locations on the outer side aperture for the Dodge Dart, including a specific location in the lower A-pillar and zones at several other locations based on the damage. A butt joint with a 13 mm backing is recommended on all the locations.

Note that the A- and B-pillar reinforcements are boron-alloyed steel, and cannot be sectioned. If the damage extends into these parts, replacement is the only option.

Notes

Objectives Worksheet

There are sectioning procedures on several locations on the Dodge Dart, including the outer side aperture.

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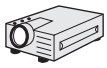
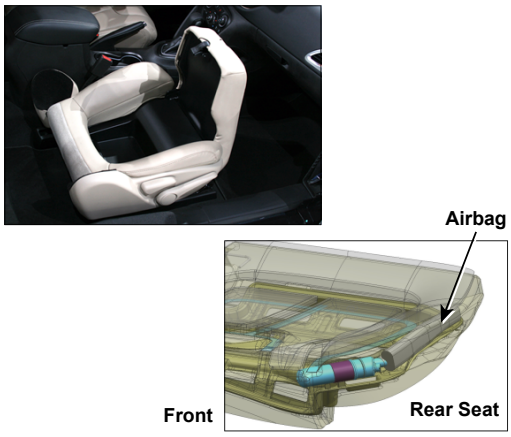
Topic A. Chrysler LLC (cont'd)



A-9

Dodge Dart Industry Firsts



Courtesy of Chrysler LLC

There are some industry firsts in the Dodge Dart interior. These include a:

- seat storage system using the front passenger seat. With this optional system, the front passenger seat cushion opens up from the rear so it is facing forward. A storage area is revealed with the seat cushion serving as a backing so items will not spill forward when the vehicle brakes.
- wireless phone charger pad option that fits in the center console. The pad may be sensitive to cleaning chemicals, so look for it when detailing the interior.
- rear seat airbag that deploys from the bottom seat cushion, instead of the seat back or door panel. The airbag is designed to protect the occupant's hip. When it deploys, the deployed module, the seat cushion, and seat cover require replacement. Child safety seats were taken into consideration in the design of the rear seat airbags. The airbags deploy without harming a child in a safety seat.

Notes

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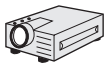
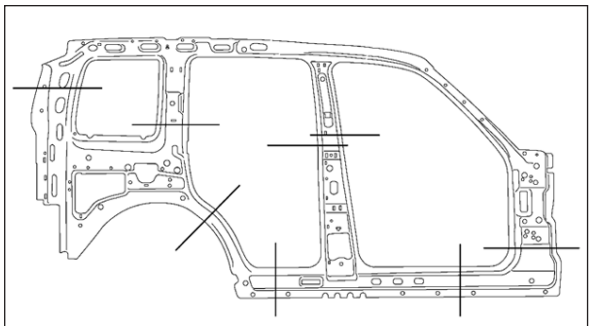
Topic A. Chrysler LLC (cont'd)



A-10

New Sectioning Procedures



2002–2007 Jeep Liberty Inner Side Panel

Courtesy of Chrysler LLC

Chrysler has published new sectioning procedures for the Jeep Liberty and Dodge Nitro. Previously, there was only a front rail procedure on these two vehicles. The procedures are available on the www.TechAuthority.com pay website.

Some locations are not specific, so there are general recommendations to not section through holes, formations, and at least 25 mm from laser weld locations.

These procedures include, for example, several sectioning locations on the 2002–2007 Jeep Liberty inner side panel. Only the B-pillar locations are specific. The remaining locations are somewhat flexible based on the damage. Butt joints with backing are recommended at the joint locations.

Notes

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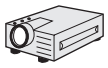
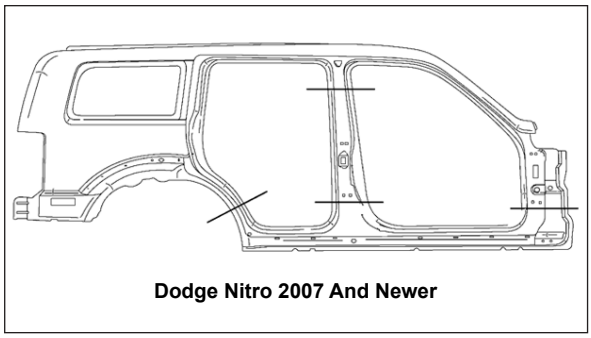
Topic A. Chrysler LLC (cont'd)



A-11

New Sectioning Procedures (cont'd)



Dodge Nitro 2007 And Newer

Courtesy of Chrysler LLC

The procedures also include locations to section the outer B-pillar on the 2007 and newer Dodge Nitro. This includes a location down from the roof rail on the outer B-pillar when the B-pillar reinforcement or inner side panel is being partially replaced. It also includes locations on the A- and B-pillar bottoms and in the dogleg area when only the rocker panel is being replaced.

Notes

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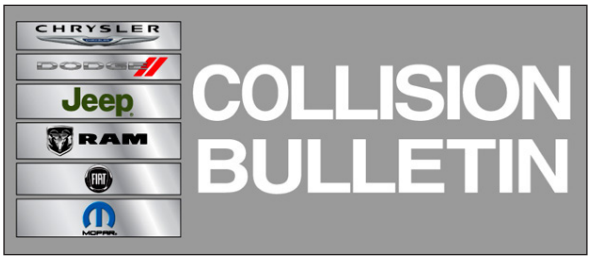
Topic A. Chrysler LLC (cont'd)

A-12

Chrysler Collision Repair Bulletins



Chrysler has started publishing bulletins specific to collision repair. These bulletins are:

- issued whenever necessary. There is no set schedule.
- available on the www.TechAuthority.com pay website. On the Service Bulletins tab, go to Group 31.

CHRYSLER COLLISION REPAIR BULLETINS

Notes

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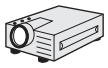
Topic A. Chrysler LLC (cont'd)



A-13

Replacement Vehicle Information Labels

MFD BY CHRYSLER GROUP LLC
DATE OF MFR: 9-10
GAWR: 3848 KG 6700 LB
GAWR FRONT: 1678 KG 3700 LB WITH P275/60R20 TIRES
2809.0 RIMS AT 240 kPa (35 PSI) COLD
GAWR REAR: 1770 KG 3900 LB WITH P275/60R20 TIRES
2809.0 RIMS AT 240 kPa (35 PSI) COLD
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.A. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
VIN: 1D7RB1GT4BS000000 TYPE: TRUCK MFR:891007 115AA
VEHICLE MADE IN U.S.A. PAINT: PAT TRIM: HAVB
TIRE AND LOADING INFORMATION
SEATING CAPACITY - TOTAL 7 FRONT 2 REAR 5
THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED
521 KG OR 1150 LB
TIRE
FRONT
REAR
SPARE
ORIGINAL TIRE SIZE
225/65R16
225/65R16
T145/90D16
COLD TIRE INFLATION PRESSURE
250 kPa / 36 PSI
250 kPa / 36 PSI
420 kPa, 60 PSI
SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION
BR677946

One of the Chrysler collision repair bulletins states that replacement vehicle information labels are now available. These labels are:

- authentic replacements for the Safety Certification and Tire Pressure labels. These two labels are only available through ECS Automotive Concepts (www.ecsvin.com).
- for the doorjamb and underhood locations. The underhood labels are available from Chrysler dealers.
- available for 1991 and newer vehicles.

Notes

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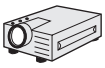
Topic B. Ford Motor Company



B-1v

Video: Tech/Trends Trivia

Notes

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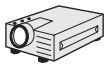
Topic B. Ford Motor Company (cont'd)



B-2

2013 Ford Fusion Family

As of the 2013 model year, there is a family of Ford Fusions available, including:

- a conventional sedan.
- a hybrid electric with a lithium-ion battery pack.
- the plug-in hybrid electric Energi, also with a lithium-ion battery pack.

Notes

Objectives Worksheet

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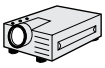
Topic B. Ford Motor Company (cont'd)



B-3

Ford On Electric Vehicle Handling

Ford has issued a guide for towing companies and others who handle severely damaged vehicles with lithium-ion batteries. The recommendations are consistent with NHTSA guidelines for electric vehicles. The recommendations include:

- being aware of the potential of a delayed fire with damaged lithium-ion batteries.
- explaining that vapors emitted from a damaged lithium-ion battery are potentially toxic and flammable.
- a precaution to store severely damaged vehicles more than 50 feet from any structures or other vehicles.

The guidance is included in the Focus Electric Emergency Response Guide, available free at the www.motorcraftservice.com website. At the website, select "Quick Guides" for a list of guides available.

FORD ON ELECTRIC VEHICLE HANDLING

Notes

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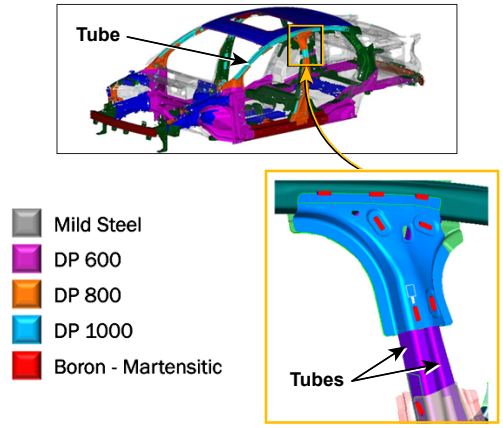
Topic B. Ford Motor Company (cont'd)

B-4

2013 Ford Fusion Tubular Structure



Great Designs in Steel 2012 Presentation

The 2013 Ford Fusion sedan structure features:

- dual-phase (DP) 1,000 MPa hydroformed tubes. There is a one-piece tube that makes up the roof rail from the base of the A-pillars to the C-pillars.
- twin tubes side by side in each B-pillar.
- boron-alloyed steel in the B-pillar reinforcements, rocker panel reinforcements, and the front and rear bumper reinforcements.

Notes

Objectives Worksheet

The 2013 Ford Fusion sedan structure features:

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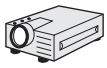
Topic B. Ford Motor Company (cont'd)



B-5

2013 Ford Escape

The 2013 Ford Escape:

- has four times as much HSS and UHSS as the previous model. One-third of the steel is advanced HSS and UHSS. The top of the A- and B-pillar reinforcements are boron-alloyed steel.
- has sectioning procedures for the exterior side aperture only.
- features side curtain airbags that stay inflated for six seconds, part of what NHTSA believes may be necessary for the airbags to be ejection mitigation devices.

Starting with the 2013 models, Ford has enhanced their repair website at www.motorcraftservice.com with improved color graphics. Material identification, including steel by specific type, is color-coded.

Notes

Objectives Worksheet

The 2013 Escape has four times as much HSS and UHSS as the previous model. One-third of the steel is advanced HSS and UHSS. The top of the A-pillar and B-pillar reinforcements are boron-alloyed steel. There are sectioning procedures for the exterior side aperture only. The Escape features side curtain airbags that stay inflated for six seconds, part of what NHTSA believes may be necessary for the airbags to be ejection mitigation devices.

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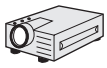
Topic B. Ford Motor Company (cont'd)



B-6

More Rear Inflatable Seat Belts

The 2013 Ford Flex and all Lincoln vehicles have a rear inflatable seat belt, a feature that began as an option on the 2011 Ford Explorer. The plan is to eventually include this feature across the entire Ford/Lincoln line.

The shoulder strap in both rear seats inflates in a frontal impact. If the seat belt is not buckled, it will not inflate. There is a cold compressed gas canister beneath each seat that inflates the airbag in the shoulder belt webbing. Once deployed, the entire seat belt assembly and gas canister must be replaced. Deployment is evident by the shoulder strap seams ripped open. The inflatable seat belts are compatible with infant and child safety car and booster seats.

Mercedes-Benz, which featured an inflatable rear seat belt on the 2009 Experimental Safety Vehicle, plans to introduce rear inflatable seat belts in one of their luxury-class vehicles.

Notes

Objectives Worksheet

The 2013 Ford Flex and all Lincoln vehicles have a rear inflatable seat belt, a feature that began as an option on the 2011 Ford Explorer. The shoulder strap in both rear seats inflates in a frontal impact. If the seat belt is not buckled, it will not inflate.

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Topic B. Ford Motor Company (cont'd)

B-7

2013 Ford C-MAX

The 2013 Ford C-MAX and C-MAX Energi:

- are the first-ever dedicated hybrid vehicles from Ford.
- are a hybrid electric called the C-MAX, and a plug-in hybrid electric called the C-MAX Energi.
- use a lithium-ion battery pack.

Notes

Objectives Worksheet

The 2013 Ford C-MAX and C-MAX Energi are the first-ever dedicated hybrid vehicles from Ford.

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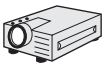
Topic C. General Motors Corporation



C-1v

Video: Tech/Trends Trivia

Notes

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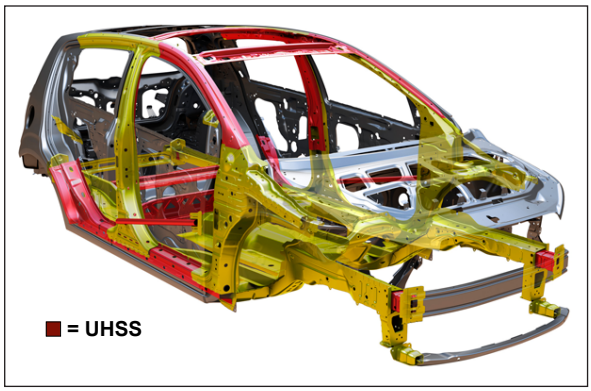
Topic C. General Motors Corporation (cont'd)

C-2

2013 Chevrolet Sonic



© General Motors

There is an extensive use of UHSS on the 2013 Chevrolet Sonic. This includes the roof header panel, center roof crossmember, inner B-pillar, inner rocker panel, and rocker panel reinforcement. These parts are only replaced.

There are several sectioning procedures on the non-UHSS parts. This includes procedures for the outer A- and B-pillar and rocker panel, inner and outer quarter panel, and rear rail.

The Sonic is made in Korea, where the service information along with the body repair information is written. GM in the U.S. does not own the service information, and they cannot change it. Besides the Sonic, the Chevrolet Spark and the Buick Encore are also made in Korea.

Notes

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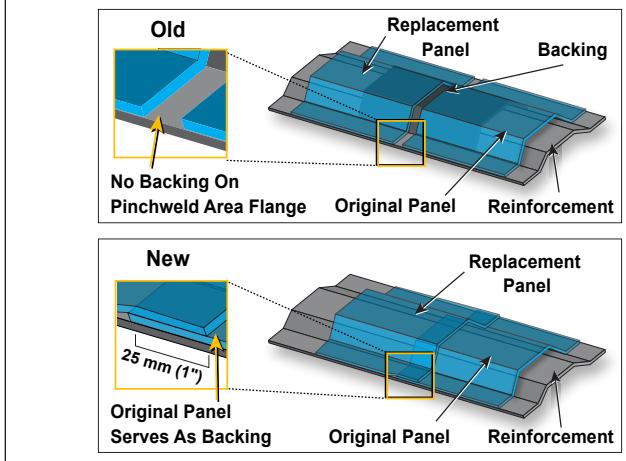
Topic C. General Motors Corporation (cont'd)

C-3



The outer sectioning joints on the Sonic represent a new trend for GM, lap joints instead of butt joints with a backing. The issue with a butt joint is that there is no protection to the UHSS reinforcement on the flange areas, which allows too much heat.

With a lap joint, the overlapped area serves as a backing along the entire joint, even on the flanges. GM is recommending a 25 mm overlap.

Notes

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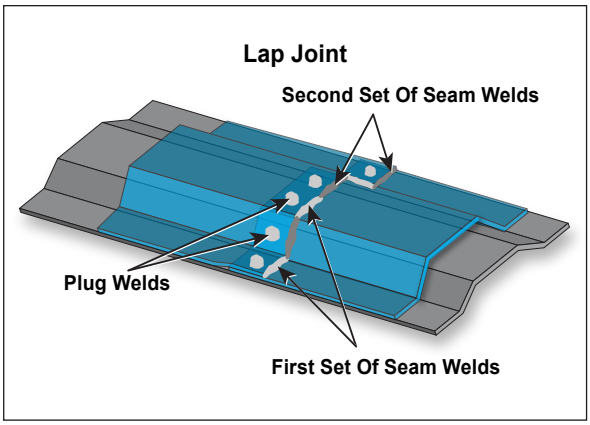
Topic C. General Motors Corporation (cont'd)

C-4

25 mm Lap Joint (cont'd)



The lap joint on outer panels:

- is recommended to be made in one-inch weld intervals, or the skip method, to also avoid excessive heat.
- is being recommended on many new uniside repairs, but especially where the outer panel is backed by a UHSS reinforcement.
- may or may not include plug welds, in addition to the fillet weld. Pay attention to the vehicle-specific recommendations in the service information.

Notes

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Topic C. General Motors Corporation (cont'd)

C-5v

Video: 2013 Cadillac ATS

This video shows some of the features on the 2013 Cadillac ATS of interest to the collision repair industry.

Notes

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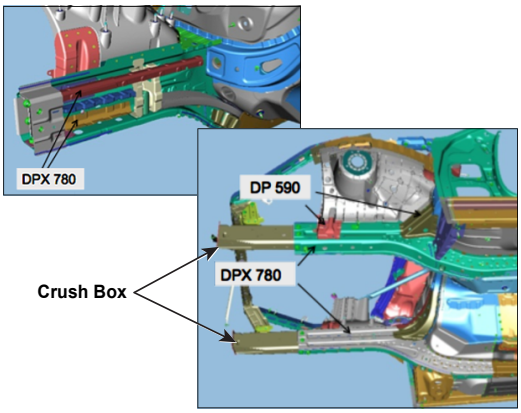
Topic C. General Motors Corporation (cont'd)

C-6

Front Lower Rails On Cadillac ATS



Courtesy of General Motors Corporation

The 2013 Cadillac ATS has more UHSS than any vehicle in GM's history. UHSS parts include the front lower rails. The front lower rails on the Cadillac ATS:

- have a bolt-on aluminum crush box in the front. Any damage rearward of the crush boxes requires complete rail replacement.
- have dual-phase (DP) 780 MPa steel inners and outers that start directly behind the crush boxes. DP 780 steel is considered UHSS. GM uses "DPX" to identify dual-phase steel over 780 MPa.
- have DP 780 MPa steel reinforcements.
- can only be replaced as a whole. There is no partial replacement.

There is a sectioning procedure for the rear rails.

Notes

Objectives Worksheet

The 2013 Cadillac ATS has more UHSS than any vehicle in GM's history. UHSS parts include the front lower rails. The front lower rails on the Cadillac ATS can only be replaced as a whole. There is no partial replacement.

There is a sectioning procedure for the rear rails.

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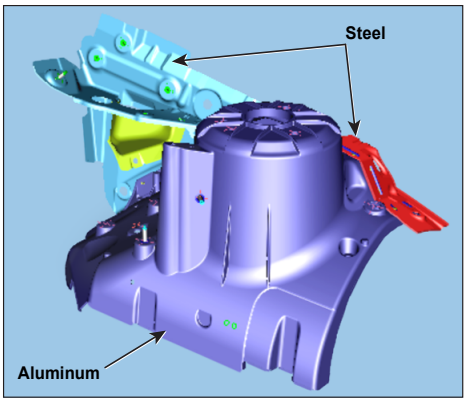
Topic C. General Motors Corporation (cont'd)

C-7

Aluminum Wheelhouse On Cadillac ATS



Courtesy of General Motors Corporation

There is an aluminum front wheelhouse on the Cadillac ATS that is bonded and riveted to steel brackets attaching it to the rest of the apron.

The service part is an assembly that is bonded and riveted to the steel upper and lower rails. This is also the way the part is installed during production.

Notes

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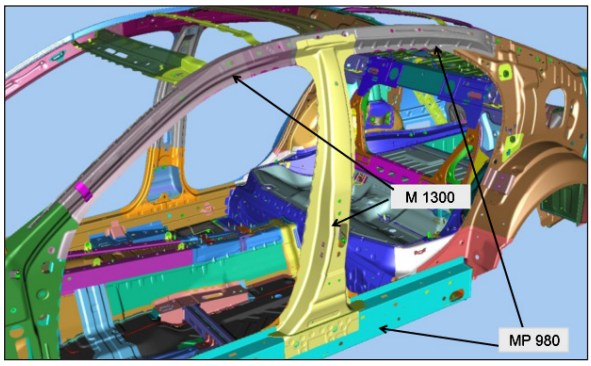
Topic C. General Motors Corporation (cont'd)

C-8

Side Structure On Cadillac ATS



Courtesy of General Motors Corporation

The side structure on the Cadillac ATS includes:

- a martensitic (M) roof rail that is 1,300 MPa steel, the highest tensile-strength steel used by GM to date. M 1,300 is also used for the B-pillar reinforcement. The rocker panel reinforcement is multi-phase (MP) 980 MPa steel. The B-pillar reinforcement is replaced in its entirety by cutting open a window in the top of the outer B-pillar. There is a warning in the service information to not cut into the UHSS roof rail when doing that procedure.
- DP 780 steel baffles in the rocker panel.
- a UHSS inner B-pillar. The top three-quarters is MP 980 MPa steel. The bottom fourth, often made of mild steel on other vehicles, is DP 780 MPa steel.

Note that the structure on the Cadillac XTS is not like the ATS. The XTS structure is similar to the 2013 Buick LaCrosse.

Notes

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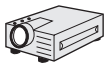
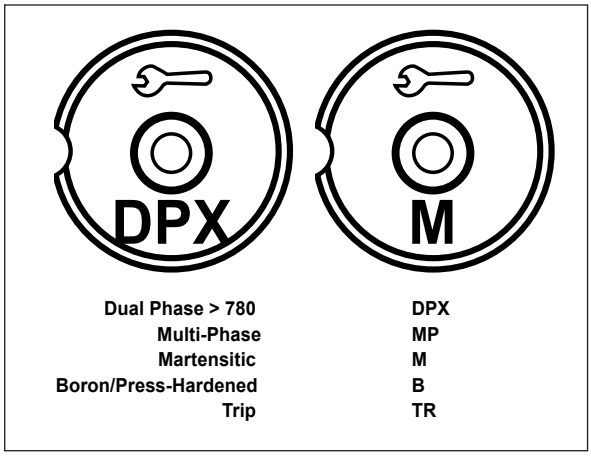
Topic C. General Motors Corporation (cont'd)



C-9

UHSS Stamp Intentions



GM intends to stamp steel parts that are 780 MPa and higher. In other words, UHSS parts will now have an embossed stamp for easier identification. The stamping begins with the 2013 Cadillac ATS. The intention is to stamp all UHSS production and service parts. For lengthy parts, such as a rocker panel, there may be multiple stamps along the length.

The stamps are to include "DPX" on dual-phase steel over 780 MPa, "MP" on multi-phase steel, "M" on martensitic steel, "B" on boron or press-hardened steel, and "TR" on TRIP steel.

Notes

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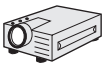
Topic C. General Motors Corporation (cont'd)



C-10v

Video: E-Assist "Hybrid"

This video shows some of the features of the GM E-assist models.

Notes

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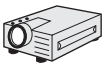
Topic C. General Motors Corporation (cont'd)



C-11v

Video: Tech/Trends Trivia

Notes

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Topic C. General Motors Corporation (cont'd)

C-12

Structural Changes To Chevrolet Volt

© General Motors

GM made some structural changes to the Chevrolet Volt in 2012 after an incident at a government testing facility. The Volt caught fire three weeks after it had been damaged in a crash test. The cause of the fire was traced to a coolant leak, caused by the impact, that later led the battery to overheat and self-ignite.

To help prevent further fire incidents, GM added a:

- safety cage around the battery.
- tamper-resistant bracket to the coolant reservoir to help prevent coolant overfill.
- sensor to monitor coolant levels.

Four new crash tests were done after the changes, and no further fire incidents were reported.

Notes

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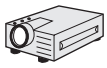
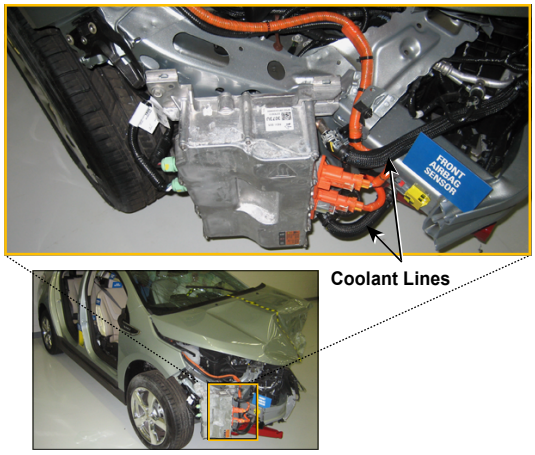
Topic C. General Motors Corporation (cont'd)



C-13

AC Charger On Chevrolet Volt



The Chevrolet Volt has been on the road in some states since 2011 and is getting damaged in collisions. One item that has been getting some attention is the exposure of the high voltage charging system that recharges the high voltage battery. The charger converts household AC into DC voltage to charge the onboard battery.

The charger is liquid-cooled, so it has two coolant lines going in and out of the unit.

Notes

Objectives Worksheet

The Chevrolet Volt has been on the road in some states since 2011 and is getting damaged in collisions. One item that has been getting some attention is the exposure of the high voltage charging system that recharges the high voltage battery.

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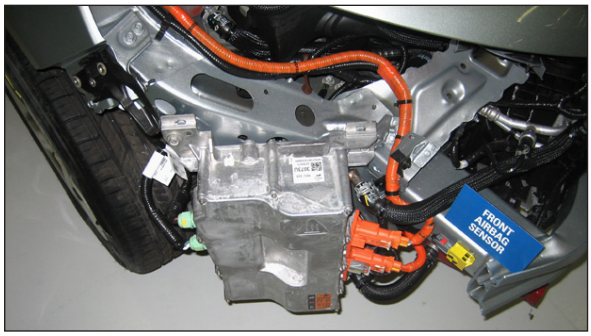
Topic C. General Motors Corporation (cont'd)

C-14

Location Of AC Charger On Chevrolet Volt



The high voltage charger on the Chevrolet Volt is located behind the passenger headlamp assembly and bumper fascia on the right side. The bumper reinforcement stops short of the charger, so it could be vulnerable in a collision.

After a front collision, inspect this unit for:

- structure damage.
- leaking coolant lines.
- damaged electrical plugs.

Notes

Objectives Worksheet

The high voltage charger on the Chevrolet Volt is located behind the passenger headlamp assembly and bumper fascia on the right side. The bumper reinforcement stops short of the charger, so it could be vulnerable in a collision.

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Topic C. General Motors Corporation (cont'd)

C-15

New Refrigerant Plans For Cadillac

The new refrigerant replacement of choice, R-1234yf, is installed on the 2013 Cadillac ATS and XTS, first in the U.S.

R-1234yf is so far in short supply. Currently, most of the refrigerant is being shipped to Europe, where a European Community regulation requires it for new vehicle platforms built after January 2011. R-1234yf has been approved by the Environmental Protection Agency (EPA), but it is not a requirement for new vehicle platforms built in North America. One incentive for U.S. vehicle makers to make the changeover, however, is that they receive credits toward their CAFÉ requirements.

Notes

Objectives Worksheet

The new refrigerant replacement of choice, R-1234yf, is installed on the 2013 Cadillac ATS and XTS, first in the U.S.

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Topic C. General Motors Corporation (cont'd)

R-1234yf cannot be mixed with R-134a. Retrofitting is not possible, so the refrigerant must be installed during the original build. But despite the CAFÉ incentive, there is not a rush for changeovers due to:

- high cost of the refrigerant, which is ten to 12-times the price of R-134a.
- inefficiency. R-1234yf is less efficient than R-134a.
- the refrigerant being slightly flammable, so more safety systems must be installed.

New recycling/recharging equipment is necessary to service these systems, but independent facilities should not have to worry about purchasing new equipment for several years.

Notes

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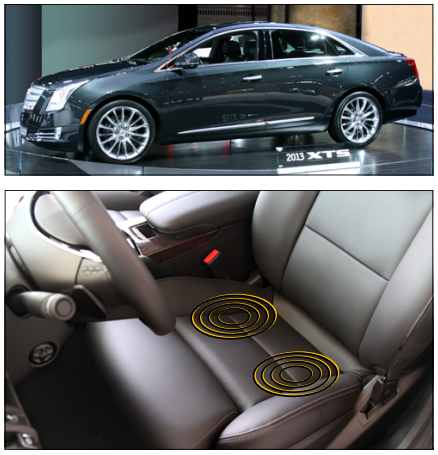
Topic C. General Motors Corporation (cont'd)

C-16

Vibrating Seat On The Cadillac XTS



While some vehicles have a vibrating steering wheel to alert the driver when the vehicle is drifting out of its lane, GM has introduced a vibrating seat to serve the same purpose. The Cadillac "Safety Alert Seat" feature, available on the 2013 XTS:

- alerts the driver of a possible collision, such as drifting out of a lane or if the vehicle is moving toward nearby objects when parking.
- vibrates either the left or right side of the driver seat cushion, depending on the side where an imminent collision is about to occur when driving or parking.
- vibrates both sides of the seat when there are threats from the front or the rear.

The system uses camera sensors to view lane markers. The vibration motors are subtle, similar to the muted ring of a cell phone. There are no recalibrations or resetting procedures when the seat is removed and reinstalled.

Notes

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Topic C. General Motors Corporation (cont'd)

C-17

First Center Airbag

A first for GM is the center airbag on the 2013 Lambda platform, which includes the GMC Acadia, Chevrolet Traverse, and Buick Enclave. The center airbag:

- deploys from the inboard side of the driver seat.
- is designed to protect the driver and front passenger in an impact on the far side, in other words, protect the driver in a right-side collision and the passenger in a left-side collision. The center airbag, combined with the regular side airbag, sandwiches the occupant in a side collision.
- is expected to be spread to other GM vehicles in future model years.

Notes

Objectives Worksheet

A first for GM is the center airbag on the 2013 Lambda platform, which includes the GMC Acadia, Chevrolet Traverse, and Buick Enclave. The center airbag deploys from the inboard side of the driver seat.

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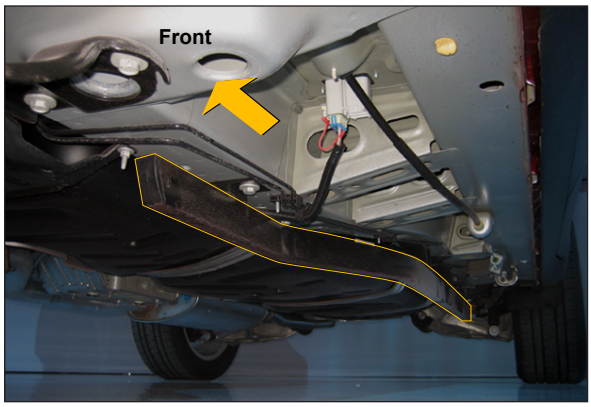
Topic C. General Motors Corporation (cont'd)

C-18

Fuel Tank Shield And Skid



Also on the 2013 GM Lambda platform, including the GMC Acadia, Chevrolet Traverse, and Buick Enclave, there is a rail-like member on the underbody that is formed along the fuel tank. This member is:

- both a visual shield and a protective skid plate to prevent the fuel tank from skidding along the ground in a collision situation.
- only on the driver side.
- not a jacking point or lift location, as it is not structural.

Notes

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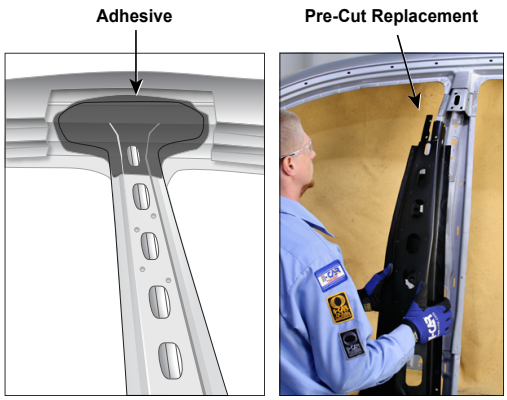
Topic C. General Motors Corporation (cont'd)

C-19

Lambda Platform B-Pillar Structural Adhesive



Also on the GM Lambda platform, including the GMC Acadia, Chevrolet Traverse, and Buick Enclave, structural adhesive has been added between the outer B-pillar and reinforcement at the top of the B-pillar. This adhesive:

- was added in 2011 to pass the government 2012 roof crush test.
- results in GM requiring the complete reinforcement assembly be replaced at factory seams. Previous to 2011, the reinforcement could be cut at the top. The replacement reinforcement came pre-cut to sleeve under the existing part. Be sure to have the correct part when ordering.
- when replaced, can only be ordered from one supplier, L&L Products. The repair information provides contact information for the adhesive kit.

There are no plans at this time to add structural adhesive to B-pillars on other GM models.

Notes

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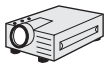
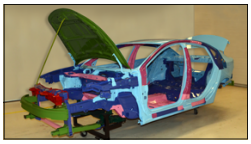
Topic D. Conclusion



D-1

Conclusion



Topics covered in this module included features on new technology and vehicles from:

- Chrysler LLC.
- Ford Motor Company.
- General Motors.

Notes

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